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ABSTRACT

Because of the drastic reduction in prices and the availability of versatile, inexpensive software, the home computer today is enjoying an exponential growth and may be effecting a fundamental change in mass communication and processes. Existing media suffer from many inherent limitations and offer unspecified audiences very low or no referability or involvement but overwhelming amounts of contents. A new medium linking the home computer with interactive television, telephone, databases, and other devices--called the Home Integrative Communications Systems (HICS)--is emerging, which is free from most of the drawbacks of existing media. The HICS offers ready referability, random access, and accessibility to numerous data bases and is not restricted to schedule, geographical confines, or time synchronization. With unlimited versatility, the HICS is a new challenge to existing media. It offers the advertiser tailor-made audiences and inexpensive, easily updated services. The challenge of new technology may result in the gradual erosion of advertising revenue for the existing media and force them to take appropriate steps. Existing media and HICS systems may live in uneasy coexistence for some time, but no one can foresee what is in store for media. (Author/LMM)

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Under the Shadow of New Technology

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ABSTRACT

Not only because of the progress made in technological sophistication but because of the drastic reduction in prices and the availability of versatile, inexpensive software, the home computer today is enjoying an exponential growth. A 64K home computer is twice as powerful as a third-generation computer, e.g. IBM 360-32K but costs only about 1/1666th (about $600) as much. Even though not all evidence is in yet, it can be safely projected that the home computer is effecting a fundamental change in mass communication and processes.

Existing media suffer from many inherent limitations: labor-intensive, ephemeral, costly and ineffective. They offer unspecified audiences very low or no referability or involvement but overwhelming amounts of contents.

A new medium linking the home computer with interactive TV, telephone, data bases and other devices called Home Integrative Communications Systems (HICS) is emerging, free from most of the drawbacks of existing media. The HICS offers ready referability, random access, and accessibility to numerous data bases so as to provide any information desired by the user.

The HICS is not restricted to schedule, geographical confines, or time-synchronization. With new devices invented almost everyday, eventually the HICS can conceivably take over all communication chores. When the HICS dwells in a wired home in a wired nation, almost all tasks, e.g. home-entertaining, home-shopping, home-banking, home-working and home-educating are made easy.

With unlimited versatility, particularly when digitalized audio-visual system is perfected, the HICS is a new challenge to existing media: It offers the advertisers tailor-made audiences and inexpensive, easily updated services and frees the user from being the slave of the time schedule.

The challenge of new technology which is reflecting on the gradual erosion of advertising revenue will force the existing media to take appropriate steps. Existing media and HICS systems may live in uneasy coexistence for some time to come, but no one can foresee what is in store for media; nevertheless, it is an exciting era, far more important and significant than all other preceding revolutions in communications.

I. THE STRUCTURAL AND FUNCTIONAL WEAKNESSES OF EXISTING MEDIA

"Newspapers are doomed," many prophets said when radio was popularized in the 1920s. "Newspapers are finished," many authoritative figures predicted when television was introduced in the 1950s. Confronted with the challenges of radio and TV, newspaper not only survived but prospered, because radio whetted the public's appetite for news and TV further stimulated the public's interest in news.

In both struggles, newspapers won by default,--not because newspapers put up tenacious defenses against the onslaught of radio and TV but because the invasion of radio and television took place almost entirely in another dimension that complemented rather than encroached upon the spatial dimension of print media.

The inherent limitations of broadcast media assured the continuing dominance and prosperity of newspapers in every market because of quite a few disadvantages suffered by radio/television vis-a-vis newspaper/magazine. Structurally, (a) no broadcast media can offer detailed information or in-depth analysis as contrasted to the print media, because broadcast media are so restricted in the temporal dimension (time) that they can present only bulletin-typed news; (b) nor broadcast programs allow random access, because their sequence must be followed at the precisely scheduled time. Functionally, (c) no broadcast media provides the audience with referability,--a factor that has been often neglected by media researchers may be defined factually that one can always go back to read a particular article or ad again; and (d) no broadcast media can actively involve the audience.

Apart from the glaring deficiencies of broadcast media, newspaper and other print media have their well known qualities: timeliness, flexibility, broad and intensive coverage, localized dissemination, fast production and prestige, among others. But their deficiencies are well known: short life, high cost, cluttering (of news and ads) and hasty readership, among others.

Despite the referability of print media, few readers keep newspapers/ magazines for more than a few days or few weeks; therefore, their referability is thrown against the throwability, as throwing away an old newspaper is very much an American habit. Despite that, the production cost for the print media is far less than that of TV, it is still extremely high as the production goes through so many labor intensive processes. Tremendous costs and efforts are required to prepare anew for each issue of newspaper/magazine, including writing, editing, proof-reading, typesetting, layout, printing and distribution.

As contrast to television, newspapers have no nationwide readership, except the Wall Street Journal, The Christian Science Monitor, and the USA Today with circulations among particular segments of the population or geographical areas. In general, a newspaper or magazine presents far more information than what an ordinary reader can read. Since newspaper/magazine is entirely on the spatial dimension;--one can always add one more page to any issue, thus print media are usually cluttered or crowded, but never entirely read.

All existing media contain some inherent weaknesses. Mass media, as the name implies, are working on the cafeteria concept, publishing or broadcasting a variety of features, ads, news or programs, and hoping that some of its offerings might be consumed. Newspaper advertising, and to a lesser extent,

magazine advertising, use a shot-gun approach, aiming at no one in particular but believing that certain ads would hit the target, as probability theory might indicate. Likewise, broadcast advertising tries to blanket an area, attempting to reach no one in particular but wishing to zero in on certain segments of the population, as the law of large numbers might dictate.

Indeed, print media may safely assume that some articles and ads are read, but a reader must laboriously go through all the articles and ads to find what he is interested in. Broadcast media may also safely assume that some programs and commercials are viewed or listened but a viewer or a listener can receive only some commercials of interest to him.

STRUCTURAL AND FUNCTIONAL WEAKNESSES OF EXISTING MEDIA

Structural	Functional
Cost: high	Referability: no or low
Labor: intensive	Involvement: No or low
Production: Complex	Audience: General or Unspecified
Life: Short	Content: Overwhelming

In the absence of any new medium, all media weaknesses can be overlooked. But it is no longer so. Almost all media in this country are supported mostly by advertising revenue. Advertisers who have no alternative laboriously go through a thousand-and-one steps to get their message across to the public. THERE IS NOW AN ALTERNATIVE.

At this infant stage of the technological development, there is no lack of skeptics who question the feasibility of such a system and its probable popularity, After discussing the pagination of classified advertising for which the ad takers with headsets and terminals set view the ad as it would appear in the paper, Mattson, president and chief operating officer of the New York Times seemed to sigh: "By the way, I haven't heard the proponents of electronic classified mention it would take 1200 screensful to equal one page of the New York Times classified--or 12,000 screensful to display the classified in a single Sunday New York Times. That translate to 66 hours to browse our Sunday classified by the screenful instead of the printed page"(Mattson, 1982). Mattson's assertion will be left without comment. Suffice it to say, the HICS system enables the user to select and provides what is desired.

Change is in the wind. The Dow Jones and Knight-Ridder interactive services allow the user to dictate what news he wants, and the Star-News, Pasadena, Claifornia, the Argus Leader, Sioux Falls, South Dakota with the pagination equipment found themselves in the direct mail advertising operation (Friendly, 1982).

After looking over the scene of newspapers and the gradual drop of advertising revenues for all existing media, Sachar (1982) comments: "The net result of the various new video technologies, regardless of their individual success, will be increased competition for all the established media--commercial television as well as newspapers." THERE IS NO RETURN FOR NEWSPAPERS AND TELEVISION.

Developmental costs aside, the HICS service can be operated with such economy mainly as the result of labor saving that no existing media can hope to match. Furthermore, the HICS can obtain any information subject available to the users. Using an inexpensive memory disk unit, a printer, a telephone, and a modern (telephone coupler), if made comparable or interfaceable to the data base services, a user can obtain, store, and transfer any information. In fact, he has the world at his keyboard. With existing networks for oral, written and visual communication connected with numerous data bases, not only can he read the morning newspaper, he can rely upon the HICS for:

- Opening and closing windows
- Raising the curtains
- Turning on and off lights
- Serving as personal information system in teleconference
- Automatically adjusting shower temperature
- Percolating coffee and cooking breakfast
- Looking at specified commercials/ads
- Buying merchandise
- Ordering theater, sports and airline tickets
- Implementing a home security system
- Providing banking services, checking, balance, interest, mortgage.
- Playing elementary and sophisticated video games
- Transfering funds
- Searching for appropriate employment
- Participating in a conference
- Working at home
- Adjusting room temperature automatically
- Accessing to all library service

All these and others have been put into practice even though no HICS can perform all these yet; given time, the HICS will become an indispensable member of a busy household.

II. THE EMERGING NEW MEDIUM

On the eve of the forthcoming communication revolution in which the home computer can be linked and interacted with a host of information processing systems and data bases, how long can the newspaper and TV maintain their respective dominant positions? Looking over the technological horizon, new technology presents both threats and opportunities as far as existing media are concerned. The threat is not IF but WHEN and WHEN is NOW.

The new challenge to all existing media is not instigated by cable TV but by an array of new technology products and systems. The main danger is not the frontal onslaught launched by new technology but the gradual erosion of advertising revenue on which all media depend. With dwindling advertising revenue as much of it will gradually be intercepted by new technological media, the decline but not the demise of existing media is palpably true.

The combination of the home computer, interactive TV, telephone and data bases that may be called the HOME INTERGRATIVE COMMUNICATIONS SYSTEM (HICS) shows none of the inherent handicaps of TV, radio, newspapers and magazines, because the HICS offerings can be so designed as to eliminate completely all the advantages except the price tag enjoyed by the print media throughout the history of journalism.

First the HICS is not as restricted as TV or radio to the temporal dimension because the HICS is accessible at any time; second, the HICS provides ready referability, as any information can be readily stored, retrived and used; third, the HICS is also accessible randomly; and fourth, the HICS can have access to thousands of data bases which provide news, commercials, classified/retail ads, or any other information.

The cable industry is moving into the interactive, integrated system vigorously as manifest in the still primitive videotext system; however, the inroad made by the cable industry is not as deep as it has been expected for two reasons: (a) The cable industry in its experimental systems attempted to convert TV viewers to interactive, integrated system users, - a much more difficult task than the conversion of home computer owners to HICS users; and (b) Cable TV offers too few wares to satisfy the needs of those who are inclined to using the HICS. Thus, successes may be more likely scored by some data base system, such as the SOURCE and COMPUSERVE, both are maneuvering into the traditional turfs of cable and conventional TV, to provide such services as purchasing, bartering, business news, and electronic travel services, among others. The New York Times offers the newly perfected data base system, capable of retrieving any article published after June 1, 1980.

Eventually both classified and retail ads will be incorporated into various data base system. Classified ads presumably will be computerized first, as they are more germine and much simpler to be compiled into data base system; however, retail ads present neither technical nor conceptual difficulties of being systematized into a data base system particularly when recall of video and audio information is made popular. Thus, not only printed pictures but also television and radio commercials can be incorporated into data bases, that is advantageous to the advertisers in many ways:

Ads or commercials (ad/com) for the data base systems can be made and updated as easily as touching a few keys on the keyboard, to illustrate, for example, prices, product/service feature, delivery, discount, and credit terms. In fact, ad/com using data base systems will practically eliminate the time-consuming and expensive layout, type-setting and printing for

the print media, or production, scheduling, and numerous detailed tasks for the broadcast media. Thus, print and broadcasting advertising can be integrated, portending enormous implications for the existing mass media.

(2) Data bases are the materialization of the ultimate rifle approach. Each user who requests the information is a POTENTIAL USER of the product/service advertised as he is actively seeking the information required for his decision making. Or at least, he is interested in the specific product/service advertised as contrast to the passive recipients of shot-gun mass media. Once a potential user discovers the ease in information seeking he may likely be a permanent, loyal user, and as such he may likely convert more and more nonusers to users.

(3) Data bases allow an ad/com to appear once or to remain indefinitely at a cost much less than conventional media. They permit the removal, inclusion, exclusion, change, enlargement, condensation or addition at minimal cost, and they also grant scheduling and re-scheduling of ad/com with minimal chores. In sum, they offer such FLEXIBILITY for advertisers that no other medium can hope to match.

(4) Data bases can group ad/com in any way that suits the user's specifications; for example, the price, year, model, make, horsepower,number of cylinders, color and displacement, among others for automobiles, the size, style, number of rooms, baths, garage, utilities, price,principal, interest rate, and mortgage for houses. Ad/com can be categorized and subcategorized by any criterion; hence,they can be cross-indexed, categorized, cross-indexed. Indeed, ad/com may prove to be the ultimate form of advertising.

(5) Data bases can be linked with marketing/advertising experiments or tests so as to provide instantaneous analysis of the popularity of product/service, advertising effectiveness as well as sales predictions. Because of this capability, time between product-testing and product introduction can be considerably shortened.

All these are based on the assumption that home computers will be widely adopted. A much wider adoption is in the wind as the prices for homecomputers are steadily dropping. A home computer terminal can be obtained for $79.95 and a telephone modem can be bought for slightly over $100.00. Together they cost less then a 13-inch color television set. With a minimum investment of less than $200.00, a primitive HICS can be installed, taking into consideration that almost every household in the United States has a television and a telephone. However, the popularization of HICS to a large extent depends on two other factors (a) The sophistication of HICS users in computer literacy; (b) The offerings of data base systems.

Neither, however, is a stumbling block for the popularization of the HICS -- as more and more households install computer terminals and more and more people begin taking advantage of the home computer, computer sophistication of the American public is gradually rising. As more and more home computers are available or accessible, data base systems will include more and more varieties of information in their services. Considering the enormous advantages offered by the HICS to the users, far more so than those to the advertisers, the popularization of the HICS may even overshadow the phenomenal rise of television a few decades ago. Just to name a few of the advantages to the HICS users:

(1) The HICS is not restricted to any program or publication schedules, as ad/com,news and other information can be incorporated into and retrieved from the system at any time, day or night. Instead of being dictated to by broadcast schedules or publication dates, the user can have access to the data based information entirely on his own initiative. He is a passive information receipient for the existing media but an active information seeker for the HICS. With the HICS at his disposal, he remains his own master all the time.

(2) The HICS is not limited by geographical confines as long as it can be linked to data base systems anywhere, London, Zurich, St. Paulo, Lago. Beijing, New York or Cairo, and as long as it is made mobile so that it can be taken anywhere. A truly international information network system may eventually emerge and link every household with the HICS.

(3) The HICS also obviates the synchronization of time for information retrieval and supply, activated at any time, HICS enables conference attendants for example, to attend the conference at any time to receive all previous discussions and to transmit his own, as succinctly described in The Network Nation: Human Communication via Computer (Hiltz & Turoff, 1978).

(4) The HICS provides specific requested information on merchandizers political/social events, sports news, services and others. Comparative shopping is at the user's finger tips. Readily obtainable too are ever changing weather information, road condition reports, and traffic situations, No information is beyond the reaches of the HICS, provided that such data bases exist.

All information retrieved from data bases can be stored in disk memory or printed out for future references, to enhance the versatility of its referability. Furthermore, information obtained through the HICS can be classified, compared and analyzed, to equip it with testability.

The obvious drawbacks of the HICS vis-a-vis news and advertising are: (a) no random reading is possible,--with a newspaper or a magazine, a reader can be randomly exposed to a certain article or ad; however, it can be argued that no article or ad is designed for random reader, each and every article or ad has its intentional target audience, (b) at this stage of HICS development, no full-fledged services of news, ads, and others have been offered to the public. But it can be expected that within a few short years, when the HICS is popularized full services would be offered, in the major markets first in the United States, and possibly Japan, Britain and France. (c) the HICS is still difficult to use. Difficulties in using the HICS will soon disappear as the drastic steps made in the simplication of hardware and in the sophistication of software. Hence, it is a safe bet that the HICS will eventually take over many functions the mass media perform today in disseminating news, ads and commercials.

In order to evaluate the impact of new technology upon existing media systems, it is imperative to examine systematically new technology relevant to present media systems.

III. NEW TECHNOLOGY

The sky is so full of communication satellites, communication between homes and satellites are already old hat. The Satellite Network Delivery Corp., New York (A Chicago Tribune supported corp.) is working on an information network, capable of distributing newsletters, catalogs and

financial information at a reasonable cost. Currently, a variety of teletext and videotext services is available. Teletext is a one-way transmission by the broadcast stations whereas videotext is an interactive system through which the user can respond, question, retrieve and order information. Eventually the services will include computer programs, video games, newspaper advertisements, movies and other programs.

Underneath all the satellites are data bases, information centers and a host of telecommunication facilities and computers. The proliferation of communication devices can be simply traced to the "chips", the microprocessors which have made the computers smaller, faster, more versatile and powerful.

A. The Supercomputer and Microcomputer Center

Both supercomputer and microcomputer are getting faster, more powerful and versatile. The supercomputers Gray-1 and Cyber1205, can perform 100 million arithmetic operations per second, just a notch below the dreamed nano second (1 billionth second per operation). The fifth generation computer, expected to go beyond the performance of 1 billion arithmetic operations per second, will be much easier to use since it has incorporated in its proto model the built-in voice-and pattern-recognition technology (BW, 4-13 1981). No longer then will it be necessary to learn any exotic and esoteric programming language or to type on the keyboard laboriously in order for anyone to use the computer.

The home computer such as the Commodore 64 just moved up to 64K last year. A desk top terminal is now as powerful as the third generation IBM-360. A microcomputer with 128K memory will be marketed within the next year. The microprocessor or computer on a chip is expected to increase computer power and versatility to unheard-of feats, taking over most, if not all, controls of

communications and machines, for example, metal-oxide semiconductors (MOS) and complimentary MOS (C-MOS) are superceding the bi-polar chips (Buss, 1982; Pollack, 1982).

A computer with the power of a large mainframe computer can be just put on three semiconductor chips and sold below $10,000 (BW, 3-2, 1981). Texas Instruments introduced its new personal computer capable of performing many functions through spoken command. IBM is about to introduce a new generation of personal computers nicknamed "peanut" and "popcorn", (Chace, 1983). With the drastic reduction of its cost and tremendous increase of its power, the computer is biding its time to take over all household chores and to link with mainframe computers in business, governments and universities.

a. Software and Memory

Each succeeding generation of software, hardware, and memory is more sophisticated and powerful than the preceeding ones. The simplicity in using the computer is, to a certain degree, inversely related to the complexity of programs. Complex programs generally require large memory and speedy processing. One way to speed up processing is to reduce the volume of memory.

There seems to be no limit on the miniaturization of computer memory. Vertical recording is capable of storing 50 to 100 times more data in the same space and is expected to be the dominant form of memory storage in 1990 (BW, 7-19, 1982). By standing magnets on end in a crystal structure made of cobalt and chrome, vertical recording allows data to be packed together without losing their strength, a major problem with horizontal recorder disks and tapes. Not incidentally, such a memory system is much more inexpensive too. Thin-film recording heads are replacing the much slower, bulky ceramic head to allow more efficient and dense recording. Software such as the LISA developed by Apple and programs for supercomputers under development in both the United States and Japan will considerably reduce the chores of learning how to use the computer. If hardware is the brain, what it contains and how it works is the software. Even more innovative works at major universities and computer manufacturers in the U.S. and abroad are in store, moving toward highly sophisticated artificial intelligence.

The digital voice exchange which converts voice to digital codes and the digital pattern exchange which converts printed copies or video to digital codes and vice versa are leading the users of computers to a new domain. One can almost hear the commands, "Read me the Lord's prayer," "Show me the Taming of The Shrew,"or, "Print the United Nations Resolution on Freedom Of Communication, 1982."

b. The New Optical Scanner

A new optical scanner converts the image of a document into digital electronic signals so that it can be stored in and retrieved through the computers. Most documents will be filed electronically rather than in drawers. The obvious advantages are: (1) Economical storage spaces, (2) Easy and fast retrieval, (3) Possible and instant analysis, and (4) Control of the paper (document) explosion.

When digitalized, thousands and thousands of words can be transmitted in a jiffy. A whole book or a series of books can be moved from point A to point B electronically.

Millions of monkeys, given millions of typewriters and millions of years may indeed reproduce all the books in the British Museum. The whole collection of the British Museum when digitalized may be transmitted in hours rather than millions of years; a feat that is very much within the realm of possibility. Its implications are not hard to detect: A censor in the Soviet Union can't perform his duties except by unplugging the computer, when electronic transference of data is implemented.

c. Digital TV and Radio

Both audio and video signals can be digitalized to deliver sounds and pictures superior to today's TV and radio. Picture alignment, ghosts, color/contrast adjustment and enhancement will be controlled.

A major advantage of digital electronics, for example, the ITT Digivision System, is the ease with which new features can be added to a set. Instead of designing brand-new circuits in hardware, as is currently required for upgrading new TV models, the digital circuitry can simply be reprogrammed with software (BW, 8-30, 1982). Integration with other computers and systems is then a matter of simple programming.

Movies, TV and radio programs can be edited, combined, and transported electronically. Random access to a movie or TV program thus becomes possible i.e., one can view, let us say, "Star Wars" at any moment on his impulse.

Furthermore the home computer will soon be an integrative system, functioning as the soul of all domestic, professional and leisure activities, linking digitalized TV, Hi-Fi, video games, TV, and telephone, and connecting all necessary devices for home-working, home-banking, and home-shopping. one may, indeed, stay at home all the time but be gainfully employed, and entertained by a wide range of games, movies and shows. Even socializing is possible with the computer-linked teleconferences with audiovisual and digital features that may eventually evolve into cocktail parties.

The only thing such a system cannot do is MAKE LOVE.

The marriage between video and computer has given birth to, to name a few: the video-computer interactive systems, e.g., simulated pilot training, and corporate training.

d. Integration of Voice, Video and Computers

The inevitable consequences of much smaller but more powerful computers are manifest in the integration of voice, video and computers. Speech and image generation requires far less computer power than speech and image recognition which is essentially a random process. A computer must possess enormous memory capacity to store the "dictionary" before digitilization can be of any use to both voice and image.

Adding a voice to the computer is almost a simple matter of attaching a voice synthesizer (less than $100.00) to the microcomputer. Voice generation or speech synthesis provides the computer with a metallic voice. A more difficult task is speech recognition which is a random process, as no computer can predict what a human is going to say, -- for a computer to recognize a human voice, it must have a memory as huge as that of a human (Gabel, 1982). Thus voice command today is restricted to numbers or limited numbers of words. But in just a few more years the personal computers will be capable of voice and pattern (image) recognition. When voice synchronization and recognition are perfected, talks between computer and person, person and computer, and computer and computer become possible, and thus, open a completely new vista of communication.

B. Data Bases

New technology helps new forms of communication grow, but the quantum jump in communication growth is the direct result of data bases. If communication technology is the vehicle, then data bases are the suburban supermarkets and departments. Data bases and new technology are now the inseparate twins rather than the chicken and egg.

A data base consists of many different files accessible or retrievable through different electronic/electrical channels by many different systems so that an individual user can obtain and analyze any specific data. Two kinds of data bases are available to the user: general data bases and specialized data bases. The former is designed for multipurposes such as the Source, CompuServe and Dow Jones, offering the user news and information, electronic mail, and even buying/bartering service, whereas the latter provides data services in specifically defined areas such as legal, medical, or social information. Specialized data bases as set up by major corporations, data base services and government agencies are flourishing.

a. Data Bases for the Microcomputer

More than 1400 data bases are in operation throughout the United States and Canada. The data base management concept is to create integrated files so that the user may generate different reports based on the same data. About 95 percent of the data bases can be reached by personal computers, for example:

COMMODITY Provides commodities brokers with all kinds of data.

CANCERPROJ provides the cancer researcher with summaries of cancer research projects.

MONEYMARKETS presents financial statistics, historical data, interest rates,

MEDLINE accesses to worldwide biomedical literature.

AGNET provides information for farmers,

LEXIS
WESTLAW } provide legal information.

Data services, not to mention our old friend the Dow Jones News Retrieval Service are available on a subscription basis. Data bases of major corporations and government agencies for internal use, however, are not accessible to home computer owners, for example, the recently installed systems by the Federal Bureau of Investigation:

OCIS: Organized Crime Information System contains information about some 50,000 habitual criminals and programs which search invisible associations between known criminals and others.

ISIS: Investigative Support Information System specializes in complex cases and analyzes all possible leads.

FCIS: Foreign Counter Intelligence System tracks the movements and associations of suspected foreign spies and international terrorists (Newsweek, 11-15, 1982).

Computer terminals have been installed in cars and carried in the attache case for instantaneous access to the data bases. Data bases generally offer more than a simple information storage and retrieval system but provide instantaneous analysis tailor-made for a particular user. The principal advantage of a data base system can be simply put: any layman with no knowledge of computers and programming can use the computers. A good example is IBM's Structured Query Language which allows a user to retrieve information by typing in English-like command on a computer terminal (BW, 8-10, 1981). Many small as well as large companies are moving into Videotex (video data based) for example, CompuServe and Source serve subscribers with news, recipes, stock quotations, games and other data banks. ComLink adds videotex to existing data processing service interconnecting different kinds of information processing systems by which users can route messages around the country electronically .

much faster than by regular telephone network. Time (TYMNET), GT&T (Talent), and AT&T are moving into the market (BW, 12-7, 1981).

b. Advantages of Data Bases

Due to drastic drop on the costs for computer and memory, the adoption of data bases has been proliferating. The advantages of data bases are many:

(1) Elimination of duplicated storage of information.

(2) Ease to find and analyze necessary information.

(3) Freeing the programming staff from housekeeping chores, associated with storing information in a computer system.

(4) Combinations of all kinds of information into one data base. For example, a bank may combine all its savings, loan, checking, and mortgage account to provide customers with an up-to-the-minute picture of their finances.

Besides storage, retrieval and analysis of information, data bases provide a systematic structure to integrate all phases and functions of an organization. Thus, the data base system is a forerunner of an integrated system of administration and instructions for a school, or of management, marketing, advertising, production and distribution for an industrial or business concern.

c. Business Data Bases

Satellites through microwaves have linked all the telephones because microwave radio communication is efficient, convenient and inexpensive. Using microwave, IBM initiated the information center concept in 1979. Now 42 percent of its large users have installed information centers, to provide information instantaneously for internal uses (BW, 9-13, 1982).

With the satellites above and all new communication gadgets below, industry and business have set up one new information center after another to handle electronic mail, video teleconferences and interoffice telephone calls.

Whereas information centers are for internal uses, information networks connect with other systems. Advanced Information System/Net 1 (developed by American Bell, an AT&T subsidiary) will allow a computer to talk back and forth with another computer of a different/same model. All major and minor makers, for example, IBM, GTE and Wang Laboratory, have developed similar information network systems. Many major organizations have PBX, the computer controlled private branch exchange, to link all the data processing and word processing equipment as well as the telephones. A logical expansion is ISX and EIS. ISX, Information Switching Exchange, handles both voice and data forwards calls, uses codes to speed dialing, redials when a line is busy, and routes outgoing long-distance calls to the least costly line (BW, 4-13 1981). EIS, Ericsson Information Systems, handles pictures,voices, and data (BW, 3-22, 1982). All 60,000 of Japan's modern office buildings will soon be equipped for video teleconferencing. The Electrical Communications Laboratory of the Nippon Telephone & Telegram (NTT) already conducts about 600 teleconferences a year with its branch labs (BW, 8-9 1982).

The traditional means of internal and external communication, it appears, are in a gradual process of disappearance. More and more organizations rely upon information centers for internal communication and also upon information networks for external communication. By various estimates, many quite dubious, the USA can have a wired nation with 90% of households "wired" with computers before this century is over. If this is the case, there will be no need, for example, for the traditional Postal Service.

d. Educational Data Bases

A whole campus can now be wired with existing technology and know-how. Each student and faculty is provided with a microcomputer linked to a number of data bases both on and off campus. Classroom lectures, though still prevalent, are out of date already. There is no reason for the student to tread through snow and rain to the classroom at a scheduled time. All instructions except a minority of laboratory courses can be given and taken through the computer systems-nearly all communications, journalism and advertising courses can be readily computerized. Education can thus be freed from geographical restriction: CAI (Computer Assisted Instruction), CIP (Computer Instruction Program), in experimentation and practice for more than 20 years, are ready for a real take off. Though not as spectacular as that of the space shuttle Columbia, CIP could have even more profound an influence over the American society. Accessible at any time, neither the student nor the instructor must observe the scheduled time. Thus, a computerized instruction system is free from temporal limitation as well. Without direct supervision and human interaction, any computerized instruction must be elaborate in its planning, development, and implementation to anticipate and forestall any possible drawback. For example, a computerized system of supervision might have to be in place, to assure that the student who takes the computerized quiz or examination is the right student and has no one to assist him. A series of long term studies must be carried out to examine the social consequences. Nevertheless, at this stage, all symptoms seem beneficial.

As audio, video, and computer merge as the result of digitalization, joint research projects should enjoy an unprecedented growth. In fact, Yale, CCNY, Princeton, Rutgers, Penn State, Brown, Boston, and Cornell have joined forces in faculty exchange and co-authorship (BW, 4-26, 1982).

Carnegie-Mellon University and IBM are developing possibly the largest computer network in the world by which each of the 5,500 students will have a computer linking university data bases.

A host of universities have embarked upon the adoption of the so-called "wired" university, for example, Rensselaer Polytechnic Institute, Princeton, Brown, Dartmouth, Swarthmore, and many others.

BITNET (because it's there) allows faculty members to exchange and co-author papers for publication via computer terminals, linking Yale CCNY, Columbia, Princeton, Rutgers, Penn State, Brown, Boston and Cornell (BW, 4-26, 1982).

The computer has been used to teach almost any subject under the Sun from elementary level to graduate studies. The computer has penetrated into every nook and crany of the society. Computer literacy is fast becoming as important as the traditional three R's - reading, writing and arithmetic, if not even more so.

The phenomenal success and proliferation in software has made the computer as easy to use as the automobile, that anyone without the slightest idea of transmission and combustion can drive.

LOGO, a programmable software, allows a child uninitiated in computer

programming to play with the computer and to program, for example, the turtle or fish. Numerous programs are available, permitting children to play with music, math, and geometrical designs.

Libraries, in an attempt to accommodate popular demand, must eventually provide computer software in addition to books. Interlibrary loans of software are expected to be initiated, in addition to current programs of linking libraries with information data bases.

Governmental information dissemination must take into account demands to provide electronic information as well.

Even the U.S. Postal Service has taken a cautious step toward Electronic Computer Originated Mail, E-COM, through which the message is sent from the user's computer to the computer in 25 postal locations in the nation, and then printed, stuffed and addressed to be delivered by mail carriers (US News & World Report, 1-18, 1982).

Home may be sweet home, but home does not provide a necessary working atmosphere - not all people can adapt to all home shopping, home banking and home working. Computer widows and widowers are emerging, not yet as numerous as football widows but a worse situation is likely to happen. Football is restricted to the season, days of the week and times of the broadcast or play, but computers are there all the time and all four seasons, to merit the exclusive attention of many psycotherapists (Dullea, 1983). Whether a marriage may be broken by the computer or not, the kids, if there are any, can always be sent to the Computer Camp (Reinhold, 1982).

IV. A Home Integrative Communications System

As inexorable as the sun rises, a home integrative communication system will emerge. Every piece of hardware and software already exists necessary for homes such as HICS - which will eventually advance to an audio-video computer interactive system of communication, control and surviellance Through the HICS all mass media should be available in addition of accessible data bases. All lighting, heating/air-conditioning, security, appliances and water/sprinkling may be controlled by the HICS. Homes and buildings will have built-in computer wiring in addition to electrical wiring and water pipes.

A. The Wired Home

Optical fiber, just like electric and telephone wires will be built-in in the building, to control temperature, humidity, light, security and communications. A tenant can plug into the building's main computer. Such buildings, as may be seen in Hartford's City Place and Texas Plaza in Irving, Texas, save time and money for the tenants to use the building's central computer (BW, 9-27, 1982). A microcomputer can be programmed to reflect weather conditions, to adjust water temperature of a hot tub, to raise and close the shades, and to control infrared lights, vacation security, and lighting (Barlow, 1982).

The Japanese are pursuing similar adventures in electronics. The NTT is expected in the next few years to complete its Character and Pattern Telephone Access Information Network (CAPTAIN), a videotex service which transmits data to home TV screens. Residents now use the system to call up news reports or weather bulletins or even place supermarket orders and reserve concert seats (BW, 8-9, 1982).

The trend seems inevitable: From the wired home, wired building, wired city, wired nation to the wired world.

B. Home Working

With a terminal and other peripheral devices many jobs can be done at home without travelling or commuting, thus professors, editors (but not reporters), secretaries, engineers, architects, accountants, and lawyers can stay at home and work. Assignments and finished works are simply transmitted back and forth via telecommunications.

If the current trend persists, as more and more people work at home on more and more job categories, streets and highways will eventually be less crowded, thus causing traffic jams to become a thing of the past, fuel comsumption to drop, and automobile sales to further dwindle.

The best and most promising feature of telecommuting is this: The handicapped and the disabled can be trained and gainfully employed. Likewise, mothers with young children can have many jobs available to them without leaving home.

C. Home Shopping

Every ware sold in the market today can be shown on the living room computer screen. An integrated video computer system demonstrates the merchandise, quotes its price, charges the buyer's bank account or credit cards, and probably schedules the delivery so that the shopper has no need to even step out of his house. Speculations are abundant: rising catalog order sales, facilitating shopping for working couples, reduced transportation costs and traffic jams, and less encounters with rude and ill-trained sales personnel (Wollman, 1982).

The systems developed by Comp*U*Star allow the shopper to search the data base, to compare product features, manufacturer, model, and prices. Similarly AT&T, American Express, Warner-Amex's QUBE all have been working to build a system for interactive shopping.

D. Home Banking

At present, bank services available at the finger tips on a 24 hour a day basis include: scheduling and reviewing, credit card payments, paying recurring bills and mortgage, and making reviewing household budgets. Future development of home banking is even more promising: airline ticketing, concert reservations, hotel reservations, vacation planning, and Heaven forbid, betting on horses, football and other sports.

The consequences of home banking services which in fact represent banks physically and symbolically, are to say the least, extraordinary: checks will be out; Visa and Mastercard will be out too; since transfer of funds is instantaneous, and less costly for all concerned. Paper work and processing cost will be drastically reduced while transactional services increase. Consequently, fraudulent charges can be reduced. Of course, no one can "float", a device of charging first without adequate balance in the account, - that may prove to be the major obstacle for the instantaneous debiting made possible by electronic processing.

E. Home Media Behavior

A HICS with necessary peripheral equipment may bring a new era to communication. A newspaper reader shall no longer be restricted to the local newspaper. He can read the New York Times, the Washington Post or the Los Angeles Times on the screen. He can retrieve any article as long as it is stored in the data base system. He can store it in his own HICS memory or print it out as he sees fit. Likewise, he can have access to a number of articles in magazines installed with data base systems. When a sufficient number of HICS data base services are installed, real, nationally circulated newspapers will emerge.

With a digitalized audio-visual system, he can watch his favorite TV show or movie at the time he wants. He can of course record whatever program for future reference or use. He wrings the control of TV/movie watching from the TV/movie scheduling, - A HICS household can program its TV/movie programs for children, for example.

A housewife can also dictate to the HICS as to what kind of ad/com she would like to see, soaps, detergents, groceries or even special sales at Sears, Penneys, or an auto dealer.

V. Conclusion

All existing media contain many structural and functional weaknesses. Almost all are high in production cost, and labor, but short in their life span and almost all have low or no referability and audience involvement. The Home Integrative Communications System with no such deficiencies poses a formidable threat to mass media as we have known. Because the HICS is not limited to the temporal dimension, one of the worst problems in the utilization of broadcast media is solved. Because the HICS provides ready referability to thousands of data bases, its versatility is unlimited. However, the danger it poses to mass media is not its takeover of all mass media functions overnight but the gradual deprivation of advertising revenue now channeled to the existing media. The HICS advantages are conspicuous.

For the advertisers with a large number of data bases, the HICS service is capable of producing and updating easily and inexpensively classified, retail ads and later commercials with reflexible scheduling. In the HICS data base ad/coms can be grouped, indexed, compared and accessed with no geographical confinement. All these features are important to advertisers, but most important of all is that the HICS is the ultimate rifle approach; each user of an ad/com is an active information seeker, predisposed to the product or service advertised.

The advantages of the HICS over existing media for the user may be, to say the least, gratifying to the advertisers. The HICS is not restricted to program or publication schedules; this alone frees the user from being a slave as a passive information receipient and turns him into his own master to determine the program and information he desires to obtain at the time he chooses.

With supercomputers, equipped with the new optical scanner, new digitalized TV and radio, the integration of voice, video and computer will eventually take place. As a result, new data bases catering to every whim and wish will spring up. Home working, home banking, home shopping, home entertaining and home media behavior are likely to undergo a complete change as well.

On the eve of HICS popularization, existing media will be forced to take appropriate steps to cope with the challenges.

Despite the phenomenal number of new gadgets invented and built for facilitating communications, no newspapers, magazines, TV and radio are going to disappear overnight; however, a decade or so from now, mass media as known today might be unrecognizable. Print media are likely to be affected sooner than broadcast media because the HICS can now perform all functions of print media, making available instantaneously updated and background news, and all forms of print ads. Since the cost of the home computer print-out is still far more than that of the newspaper on the street, only elite and prestigeous publications led by the New York Times will provide information data bases services as thay have more affluent readers than less prestigeous publications.

Dow Jones new/retrieval, CompuServe, the Source, and the New York Times are likely to expand their data bases. One may safely assume the proliferation of regional newspaper data base services - because the market is there. Classified ads and retail ads of major publications may closely follow the lead of news data bases.

Electronic yellow pages, data bases and information networks tend to erode advertising revenue for mass media. The electronic yellow page experiment by AT&T in Austin Texas, enjoined by the court not to test the yellow page concept for seven years (Cohen, 1981) is a case in point. How long can the newspapers withstand the tidal wave of electronic ads? It is a question of how soon, not if, the HICS will overshadow broadcasting commercials and print ads.

No newspaper as far as it can be determined has categorized classified ads into easy-to-use classifications. To wit, classified ads have never been finely classified, despite the name. A hapless classified ad user must painstakingly go through all similar ads in order to find some ads correspondent to his interest at the time, be it house-hunting, job-hunting, or looking for a car.

Classified ads are classified by major categories, adequate for the 19th century newspapers in which ads only numbered in the hundreds, but today's metropolitan newspapers print thousands of classified ads. No classified ad section provides the users with a classification system from which a user can readily retrieve a particular type of information he wants. For example, a house hunter may need only houses in a certain area within a certain district, of a certain price range, size, style, number of bathrooms, bedrooms, dining rooms, utility room, etc. A used-car buyer would appreciate information concerning year, model, mileage, price, color, displacement, cylinders etc.

Only HICS classified ads can satisfy the demands of classified ad users.

TV is not entirely immune, but will suffer far less than the print media from the popularized HICS in the forseeable future, because a television data base is almost entirely different from information data bases. First, it is technologically far more involving and complex than information data bases; second, it is costly to develop and maintain; and third, it is not yet ready to provide random selection of TV programs and commercials yet.

Despite the enormity of technological complexity, all technological know-how and devices are already in place for a TV data base system. For the cost of its research and development, though huge, is mostly on the other end of the interactive TV tube; many enterprising corporations might be willing to take the risk. But the biggest hurdle might be to equip such a data base with the capability of providing random selection of TV programs and movies. Random selection can be designed in two ways; for the program providers, both are expensive, but one is expensive and the other for the users is not. In the first way, the program providers must build a huge memory bank and transmission facilities through laser beams, microwaves or fibre optical wires to provide programs or commercials as requested. As the requested program goes through the carrier sequentially, it may be the most expensive way to transmit programs. Only large corporations or government agencies can afford such services. John Doe is not likely to watch randomly selected movie or TV programs through the HICS for a few hundred dollars.

The second way is not costly at all for the user. A batch transmission/reception system can be perfected with the existing technology for digitalized audio/video program, i.e., a whole TV program or movie can be transmitted

in a bulk within a short duration to be stored in the recipient's HICS memory and then dished out sequentially for human consumption. Much like dispatching and receiving a whole trainload of goods, to be used one item at a time later, the batch transportation of program when perfected will mark the birth of another era in telecommunication.

For better or for worse, it is an exciting era to watch.

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